

CLAIMS

What is Claimed is:

1. A dispersion compensating fiber, comprising:
 - a refractive index profile having
 - a central core segment with
 - an inner peak having a relative refractive index $\Delta_i\%$ located at a radius r_i of between $0.0\ \mu\text{m}$ and $1.0\ \mu\text{m}$,
 - an outer peak with a relative refractive index $\Delta_o\%$ located at a radius r_o between $1.5\ \mu\text{m}$ and $2.5\ \mu\text{m}$, and
 - a trough positioned between the inner peak and outer peak having a minimum relative refractive index $\Delta_t\%$ less than both $\Delta_i\%$ and $\Delta_o\%$,
 - a moat segment, surrounding the central core segment, having a relative refractive index $\Delta_2\%$, and
 - a ring segment, surrounding the moat segment, having a positive relative refractive index $\Delta_3\%$ wherein $\Delta_i\%$ and $\Delta_3\%$ are greater than $\Delta_2\%$.
2. The dispersion compensating fiber of claim 1 having a total dispersion at $1550\ \text{nm}$ of between -50 and $-100\ \text{ps/nm/km}$.
3. The dispersion compensating fiber of claim 4 having a total dispersion slope at $1550\ \text{nm}$ of -1.0 to $-2.5\ \text{ps/nm}^2/\text{km}$.
4. The dispersion compensating fiber of claim 1 having a kappa, defined as a ratio of total dispersion at $1550\ \text{nm}$ divided by total dispersion slope at $1550\ \text{nm}$, of less than $100\ \text{nm}$.
5. The dispersion compensating fiber of claim 1 having an effective area at $1550\ \text{nm}$ of greater than $20\ \mu\text{m}^2$.
6. The dispersion compensating fiber of claim 5 having an effective area at $1550\ \text{nm}$ of greater than $25\ \mu\text{m}^2$.

7. The dispersion compensating fiber of claim 1 wherein the inner peak index $\Delta_1\%$ is between 0.5% to 2.0%.
8. The dispersion compensating fiber of claim 1 wherein the inner peak is located at a radius r_i of between 0.0 μm and 0.85 μm .
9. The dispersion compensating fiber of claim 1 wherein the outer peak index $\Delta_1\%$ is between 0.9% to 2.0%.
10. The dispersion compensating fiber of claim 1 wherein the outer peak is located at a radius r_o between 1.4 μm and 2.4 μm .
11. The dispersion compensating fiber of claim 1 wherein the minimum trough index $\Delta_t\%$ is between 0.3% to 1.0%.
12. An optical fiber span, comprising:
 - a transmission fiber operating in a wavelength band having a center operating wavelength, and
 - the dispersion compensating fiber of claim 1 optically coupled to the transmission fiber, wherein a dispersion minima of the dispersion compensating fiber is positioned at least 55 nm above the center operating wavelength.
13. An optical fiber span, comprising:
 - a transmission fiber operating in a wavelength band having a center operating wavelength, and
 - the dispersion compensating fiber of claim 1 optically coupled to the transmission fiber, wherein a residual dispersion of the span is less than ± 25 ps/nm per 100 km of the transmission fiber over a wavelength band of between about 1527 to 1567 nm.

14. A dispersion compensating module comprising the dispersion compensating fiber of claim 1.
15. The dispersion compensating fiber of claim 1 having a kappa, defined as a ratio of total dispersion to total dispersion slope at 1550 nm, of between 35 nm to 65 nm.
16. The dispersion compensating fiber of claim 1 wherein $\Delta_2\%$ is less than -0.5%.
17. The dispersion compensating fiber of claim 1 wherein the relative refractive index $\Delta_3\%$ of the ring segment is greater than 0.4%.
18. The dispersion compensating fiber of claim 17 wherein $\Delta_3\%$ is between 0.5% to 1.0%.
19. A dispersion compensating fiber, comprising:
a refractive index profile having
 a central core segment with
 an inner peak with a relative refractive index $\Delta_i\%$ in the range from 0.7% to 2.0% located at a radius r_i of between 0.0 μm and 1.0 μm ,
 an outer peak with a relative refractive index $\Delta_o\%$ in the range from 0.7% to 2.0% located at a radius r_o between 1.5 μm and 2.5 μm , and
 a trough positioned between the inner peak and the outer peak having a minimum trough index $\Delta_t\%$ in the range from 0.3% to 1.0% wherein $\Delta_t\%$ is less than both $\Delta_i\%$ and $\Delta_o\%$,
 a moat segment, surrounding the central core segment, having a negative relative refractive index $\Delta_2\%$ more negative than -0.5%, and
 a ring segment, surrounding the moat segment, having a relative refractive index $\Delta_3\%$ greater than 0.4%.

20. A dispersion compensating fiber, comprising:
- a refractive index profile having
 - a central core segment with
 - an inner peak with a relative refractive index $\Delta_i\%$ in the range from 0.5% to 2.0% located at a radius r_i of between 0.0 μm and 0.85 μm ,
 - an outer peak with a relative refractive index $\Delta_o\%$ in the range from 0.9% to 2.0% located at a radius r_o between 1.5 μm and 2.5 μm , and
 - a trough positioned between the inner peak and the outer peak having a minimum trough index $\Delta_t\%$ in the range from 0.3% to 1.0% wherein $\Delta_t\%$ is less than both $\Delta_i\%$ and $\Delta_o\%$,
 - a moat segment, surrounding the central core segment, having a negative relative refractive index $\Delta_2\%$ between about -0.5 to -1.0%, and
 - a ring segment, surrounding the moat segment, having a relative refractive index $\Delta_3\%$ of between about 0.5 to 1.0%.